SHORT REPORT

International Variations in AAA Screening CME

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Introduction: Abdominal aortic aneurysm (AAA) screening programmes reduce AAA-related mortality and are cost-effective. This study aims to assess the state and variability of AAA screening programmes worldwide.
Methods: Data were obtained from an international expert group convened at the 34th Charing Cross Symposium as well as government websites and published reports on screening programmes.
Results: Six countries are in the process of implementing national AAA screening programmes, with Italy still performing screening trials. There is wide variability in inclusion criteria between countries with the majority screening only men in their 65th year, however 3 programmes include women, 2 programmes only include patients with high cardiovascular risk, and 2 trials are also screening for hypertension and lower limb atherosclerosis. Surveillance intervals vary between screening programmes, with the most common regimen being to vary the surveillance interval depending upon aneurysm size, however the optimum surveillance interval in terms of decreasing mortality and cost effectiveness remains uncertain.
Discussion: International dissemination of current AAA screening programme outcomes is required to inform developing programmes about optimum screening intervals, benefits of surveillance of the subaneurysmal aorta, and screening for other cardiovascular disease.

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INTRODUCTION

Abdominal aortic aneurysms (AAA) are responsible for approximately 7000 deaths per annum in England and Wales, principally due to aneurysm rupture. Since the mortality rate of AAA repair is reduced by a factor of 10 when performed electively rather than as an emergency, detecting and treating AAA prior to rupture is clinically beneficial. Randomized controlled trials (RCTs) have demonstrated that screening asymptomatic men over 65 for AAA reduces AAA-related mortality. These benefits remain significant at both 7-[1] and 10-year[2] follow up. Several studies have determined that screening for AAA is cost-effective.[3-5] The Health Technology Assessment is also currently undertaking a report into the cost-effectiveness of AAA screening in the UK, taking the decreasing incidence of AAA into account. Their preliminary results (unpublished data) suggest that screening remains cost-effective at the current reported incidence of 1.7%. The evidence therefore supports AAA screening as a cost-effective strategy to prevent deaths. Despite this only a handful of developed countries worldwide have invested in national screening programmes. The aim of this study was to assess the state and variability of AAA screening programmes worldwide.

METHODS

Data were obtained from an international expert group convened at the 34th Charing Cross symposium, specifically to determine the uptake and delivery of AAA screening worldwide. A standardised study proforma was given to all senior members of the expert group. The proforma asked about whether a national screening programme was running within the country, the population covered by screening, the method used to image the aorta, the aortic diameter considered to be aneurysmal, the aortic diameter at which patients were referred to a vascular surgeon, the frequency of surveillance, the start date of the programme, the total number of patients screened, the age and gender of participants screened, the incidence of AAA within the programme, and the mortality from repair of screen-detected aneurysms. The responses were collated by PS and ND. Additional data was obtained from published reports on screening programmes that took place in the countries which responded. Additional countries with screening programmes which did not have a representative at the meeting were reviewed through their respective government websites and published reports. Details relating to any

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additional national or regional screening programmes or trials were also collected from the www.clinicaltrials.gov website.

RESULTS

Completed proformas were returned by all countries which had representatives attending the meeting, including Denmark, England, Finland, Italy, New Zealand, Norway, Scotland, Sweden, Wales and Western Australia. Data on screening programmes in the USA and Northern Ireland was obtained from government websites. A summary of the aggregated data is shown in Table 1.

State of screening programmes

Sweden, England, Scotland, Wales, Northern Ireland and the USA have implemented or are in the process of implementing nationwide AAA screening programmes. Finland has only conducted cost-effectiveness modelling (concluding that one-time AAA screening for men at the age of 65 is more cost-effective than offering no screening at all). Both Denmark (ClinicalTrials.gov NCT00662480) and Norway (NCT01248533) have ongoing randomised controlled trials (RCTs) looking at the impact of screening on all-cause mortality however the Norway trial is limited to Oslo. Both studies are simultaneously screening for hypertension and lower limb atherosclerosis and also look at the incidence of cardiovascular events as a secondary outcome measure. In Italy, screening has begun in Genoa only but it is unclear whether this is an RCT or a regional screening programme (no NCT number available). Netherlands also started a trial in July 2012 (NCT01643317, data unavailable). Outside Europe, Western Australia completed an RCT between 1996 and 1998 but has not continued surveillance, and New Zealand has recently started to offer aneurysm screening, however, the geographical coverage of the programme was not documented.

Screening criteria

All countries perform screening for men, with the USA, New Zealand and Italy also screening women. All countries screen individuals in their 65th year or older, with New Zealand only screening subjects with high cardiovascular risk, and the USA only screening ever smokers.

Aortic measurement and definitions

All screening programmes use a single ultrasound scan to determine aortic diameter. All countries define the minimum diameter for an aneurysm as $\geq$30 mm. Some Swedish counties, Oslo and USA also include subjects with subaneurysmal aortic dilatation (25–29 mm) in their surveillance programme, offering them a repeat scan after 5 years.

Surveillance interval

There is marked variation in surveillance frequency between countries (Table 2). The most common regimen is to vary the surveillance interval depending upon aneurysm size, however, there is an agreement that the optimum surveillance interval in terms of decreasing mortality and cost effectiveness remains uncertain.

Aneurysm prevalence and incidence

The prevalence of AAA in older men detected through population screening has varied from 7% in Western Australia

Table 1. Comparison of aneurysm screening programmes and trials worldwide.

Country	Start date trial	End date trial	National screening implemented	Population screened in trial	Population covered by screening programme	Total screened thus far	Age group invited	Gender
Western Australia	1996	1998	No	12 203	N/A	12 203	65–79 years	Male
Denmark (2 trials)	1994 2008	1995 2010	No	4843 25 000	N/A	29 843	65–74 years	Male
England (2 trials)	1997 1988	1999 1994	Yes started 2009	27 147 5394	51 000 000	52 000	65th year (65–74 years in trial)	Male
Finland*	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A
Norway	2011	2029	Oslo only	N/A	2000/year	1116	65 years	Male
New Zealand	2012	Ongoing	No	2000	300 000	250	High cardiovascular risk	Male and Female
Scotland	N/A	N/A	Yes started July 2012	N/A	5 200 000	Unknown	65th year	Male
Sweden	N/A	N/A	Yes started 2006	N/A	8 100 000	Attendance rate 85%	65 years (65–74 years in trial)	Male
Italy	2007	Ongoing	No	8234	N/A	8234	65 years and over	Male and Female
Wales	N/A	N/A	Due to start 2012	N/A	2 900 000	N/A	65th year	Male
Northern Ireland	N/A	N/A	Yes started July 2012	N/A	1 800 000	Unknown	65th year	Male
USA (Society for Vascular Surgery guidelines)	2007	2008	Recommends if ever smoked >100 cigarettes	2918	311 000 000	Unknown	60–85 years Male 60–85 years Female with cardiovascular risk Over 50 if family history	Male and Female

* Finland evaluated the cost-effectiveness of screening, but have not yet begun national screening.

Table 2. Worldwide surveillance intervals for population aneurysm screening.

Country	What diameter is considered an aneurysm	What size is referred for consideration of surgery	Prevalence of AAA in subjects undergoing screening	Surveillance interval	Mortality from repair of screen-detected aneurysms
Western Australia	≥30 mm	≥50 mm	≥30 mm 7% ≥ 55 mm 2.5%	6–12 monthly	65–74 year men 2.5%
Denmark	≥30 mm	≥50 mm (but not considered for surgery until 55 mm)	3.3%	Annually (2–4 times annually if +55 mm)	1.5%
England	≥30 mm	≥55 mm	1.7%	30–44 mm yearly 45–54 mm 3 monthly	0.77%
Norway	≥30 mm	≥55 mm	3.4%	25–29 mm after 5 years 30–40 mm every 2 years 40–45 mm yearly >45 mm every 3–6 months	0%
New Zealand	≥30 mm	≥55 mm	Pilot 8.9% in high cardiovascular risk males >65 years	Annually	Unknown
Scotland	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
Sweden	≥30 mm however many counties offer a 5 year follow up scan if 25–29 mm	≥55 mm	1.7% + 0.5% already known outside of programme	25–29 mm after 5 years 30–39 mm every 2 years 40–44 mm yearly 45–50 mm 6 monthly 50–55 mm 3 monthly	0%
Italy	≥30 mm	≥50 mm	6.2%	6 monthly	0.61%
Wales	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
Northern Ireland	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
USA	≥30 mm	≥50 mm	Unknown	26–29 mm 5 yearly 30–34 mm 3 yearly 35–44 mm 12 monthly 45–54 mm 6 monthly	Unknown

(1996–1998) to 1.7% in both England and Sweden (2010–2011). New Zealand reports an early incidence of 8.9% in subjects of high cardiovascular risk (2012). Mortality from aneurysm repair of screen-detected aneurysms ranged from 0% in Norway and Sweden to 2.5% in Western Australia.

CONCLUSION

Although AAA screening has consistently been shown to be cost-effective in reducing aneurysm-related mortality, the instigation of national AAA screening programmes remains sparse. A number of factors such as up-front costs,[6] ultrasonographer training, database development, and geographical distribution of ultrasonographers are significant barriers to the introduction of national AAA screening. Countries considering AAA screening programmes could usefully benefit from the experience of existing programmes in other countries, allowing more cost-effective screening to take place For example a recent report from the USA found over a quarter of individuals screened for AAA were referred inappropriately, either on the basis of age or sex.[7] It is imperative that existing national AAA screening programmes publish the successes and shortcomings of their programmes, to add to the existing reports from the UK,[1–2] USA,[8] Denmark[9] and Australia.[10] Further information from existing programmes is required on the results of different screening models, the outcome of rescanning the subaneurysmal aorta, optimum screening intervals, mortality rates, and the outcome of screening for additional conditions such as peripheral vascular disease.

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CONFLICTS OF INTEREST

Nil.

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